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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,463	08/15/2003	Richard A. Gottscho	LAM1P141D1	2171
22434	7590	08/02/2006	EXAMINER	
BEYER WEAVER & THOMAS, LLP			TUROCY, DAVID P	
P.O. BOX 70250			ART UNIT	
OAKLAND, CA 94612-0250			PAPER NUMBER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/642,463	Applicant(s) GOTTSCHO ET AL.	
	Examiner David Turocy	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-9 and 11-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-9, 11-27 and 29 is/are rejected.
- 7) ☒ Claim(s) 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/31/2006 has been entered.

Response to Amendment

2. Applicant's amendment, filed 3/31/2006, has been fully considered by the examiner. The examiner notes the amendment to claims 1 and 15 and the addition of new claims 22-29. Claims 2-29 are pending in the instant application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 2, 4, 9, 11-15, 17-20, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6203862 by Bluck et al., hereafter Bluck.

Bluck discloses a method for processing a work piece discloses providing a processing chamber with a work piece, including a first processing zone and a second processing zone (figure 1). Bluck discloses continuously switching between outputting the plasma-forming component into the first zone without outputting into the second zone and outputting into the second zone without outputting into the first zone (figure 2-3, column 2, lines 35-39, column 4, lines 15-43). Bluck discloses the time multiplexing technique to supply plasma forming ion gas from a single source, therefore Bluck alternates during generation of plasma (Column 3, lines 50-58, Column 4, lines 34-42). Additionally the examiner notes, sustaining a plasma does not require a time limit for sustaining, only that a plasma is present during the continual switching, and plasma is broadly a gas that contains ions and electrons and it is the examiners position that during the process of Bluck some amount of plasma exists within the process chamber during the switching between the chamber zones.

Claim 4: Bluck discloses different times to the first and second zones (Column 4, lines 45-50).

Claim 9: Bluck discloses using a single component source (figure 1).

Claims 11 and 18: Bluck discloses providing a plasma forming component of energy (Column 3, lines 50-58).

Claim 12: Bluck discloses producing an electric field inside the process chamber (column 3, lines 19-34.)

Claim 14: Bluck discloses releasing gaseous material inside the process chamber (Figure 1).

Claims 19 and 20: Bluck discloses providing the first plasma-forming component (gas) into the chamber alternately into each of the zones and also discloses providing energy alternately into each of the zones to form the plasma (Column 3, lines 50-58, Column 4, lines 34-42).

Claim 29: Bluck discloses outputting the plasma source the same distance from the workpiece (Figure 1).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 8, 16, 21, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bluck in view of US Patent 5522934 by Suzuki et al., hereafter Suzuki.

Bluck teaches all the limitations of these claims as discussed above, and additionally discloses multiple plasma sources on the same side of a substrate to deposit a film using the same time multiplexing technique (Column 2, lines 20-38). However, the reference fails to disclose providing a central zone and an outer zone during deposition.

However, Suzuki, teaching of a method for plasma depositing a layer onto a substrate, discloses including multiple plasma sources on the same side of the substrate including, plasma gas injection holes located closer to the center and additionally plasma gas injection holds located at an outer area (Column 7, lines 37-67). Suzuki discloses such a formation provides uniformity of film formation as well as keeping a high efficiency (Column 7, lines 37-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bluck to provide a central zone and outer zone during plasma deposition as suggested by Suzuki to provide a desirable film deposition with a reasonable expectation of success because Suzuki discloses providing plasma sources near the central region and outer regions on the substrate is known in the art to provide

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film uniformity and sustain film forming efficiency and therefore would reasonably be expected to effectively provide those benefits for the plasma deposition process as taught by Bluck.

Claim 25: Bluck discloses delivering the plasma-forming component to the process chamber continuously (Figure 2).

8. Claims 2-9, 12-17, 19, and 22-24 rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6009830 by Li et al., hereafter Li.

Li discloses a method for processing a work piece with a gaseous plasma-forming component from a single component source comprising providing a work piece in a process chamber with two zones, an outer periphery zone and a central zone (Column 3, lines 1-5). Li discloses outputting the components to the second (periphery) zone without outputting the component to the first (central) zone (Column 5, lines 45-48). Li discloses providing various components to the periphery zone and central zone, including a second plasma-forming component from a second source (Column 6, lines 14-16). Li discloses providing an electric field in the plasma chamber (Figure 1, column 3, lines 26-28). Li discloses an external electrode (24) (figure 2).

Li does not disclose outputting the component into the first process zone without outputting into the second processing zone and continuously switching between the two to effect the concentration of the component.

However, Li discloses, at column 6, lines 42-57, the desire to control the balance of species distribution around the chamber among ions, radicals, and by products by

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controlling the flow rate into the zones of the chamber. In addition Li discloses providing any gas combination to be supplied into either zone by controlling mass flow rate and valves (Column 5, lines 10-18). It would have been obvious to control the amount of species distribution in the chamber by controlling the flow rates of the gases to each region, including not flowing the components, by continuously and alternatively switching the gas flow rate between no flow and flow between the different regions because by doing so one would have reasonably been expected to provide desired control of distribution and uniformity of the ions and radicals. The examiner notes, sustaining a plasma does not require a time limit for sustaining, only that a plasma is present during the continual switching, and plasma is broadly a gas that contains ions and electrons and it is the examiners position that during the process of Li some amount of plasma exists within the process chamber because the process of Li discloses control over the ion concentration.

As to controlling ratio of gas components to each zone and the timing for providing each component, these factors would clearly affect the amount of distribution of ions and radicals produced as these affect the amount of gas present for the production of such ions and radicals, therefore it would have been obvious to control these facts to control the distribution. Wherein the controller of Li is connected independently to each of the gas source lines and therefore they are controlled separately.

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9. Claims 11 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li in view of US Patent 6113731 by Shan et al., hereafter Shan

Li teaches all the limitations of these claims as discussed above in the 35 USC 103(a) rejection above and discloses the desire to control the distribution of ions and radicals throughout the process chamber but Li fails to disclose providing controlling energy in the first and second zones.

However, Shan discloses a plasma chamber including controlling the energy throughout the process will result in control of the ion distribution and increase spatial uniformity, thereby reducing the risk of damage to the substrate.

Therefore it would have been obvious to one of ordinary skill in the art to modify Li to selectively control the energy within the plasma chamber as taught by Shan with the reasonable expectation of improving ion distribution throughout the process chamber and reap the benefits of reducing the damage to the substrate during processing.

Allowable Subject Matter

10. Claim 28 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: None of the prior art cited or reviewed by the examiner clearly discloses two time multiplexing operation, which are different from each other, to supply gas and/or

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energy to the inner and outer section of the process chamber to process a semiconductor wafer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


David Turocy

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TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER